

CAPSULE SUMMARY

Building E5452

MIHP # HA-2096

Edgewood Area, Aberdeen Proving Ground

Harford County, Maryland

1918

Public-Restricted

Building E5452 was constructed as part of a multi-building mustard gas production plant at Edgewood Arsenal. Located on Gunpowder Neck in Harford County, Maryland, Edgewood Arsenal was founded by the U.S. Army in 1917 as the first chemical warfare production facility in the United States. The arsenal was established in response to the appearance of toxic gas weapons on the European battlefields. Edgewood Arsenal remained the only government-owned and operated chemical warfare installation in the U.S. until World War II. Edgewood Arsenal continued as the headquarters of the expanded chemical warfare program and the center for specialized and experimental tasks. Although established as a separate installation, Edgewood Arsenal currently is known as Edgewood Area of nearby Aberdeen Proving Ground. The two installations were joined administratively in 1971.

Because of its association with the World War I mustard gas plant established at Edgewood Arsenal, Building E5452 was identified as possessing significance for listing in the National Register of Historic Places under Criterion A during a building survey conducted by the Historic American Buildings Survey in 1982.

Building E5452 is a two-story building that measures approximately 100 (7 bays) x 60 (3 bays) feet. The building has a steel frame infilled with structural clay tile. The exterior walls are stuccoed and painted. The building has a monitor roof with a continuous band of steel-frame industrial sash windows. The roof is sheathed with asphalt shingles. A continuous band of steel-frame industrial sash windows is located under the eave line in each long elevation. Single and multiple industrial sash windows also are located in the lower sections of the walls. Multiple doorways contain single and paired metal doors with lights. The building currently is vacant and is extensively deteriorated.

Maryland Historical Trust

Maryland Inventory of Historic Properties Form

Inventory No. HA-2096

1. Name of Property (indicate preferred name)

historic Building E5452

other

2. Location

street and number Edgewood Area, Aberdeen Proving Ground X not for publication

city, town Edgewood, MD X vicinity

county Harford

3. Owner of Property (give names and mailing addresses of all owners)

name U.S. Army Garrison, APG, Department of the Army, DoD

street and number 2201 Aberdeen Blvd telephone 410-278-6756

city, town APG state MD zip code 21005

4. Location of Legal Description

courthouse, registry of deeds, etc. Harford County Courthouse liber folio

city, town Bel Air tax map tax parcel tax ID number

5. Primary Location of Additional Data

- ☐ Contributing Resource in National Register District
☐ Contributing Resource in Local Historic District
☒ Determined Eligible for the National Register/Maryland Register
☐ Determined Ineligible for the National Register/Maryland Register
☒ Recorded by HABS/HAER
☐ Historic Structure Report or Research Report at MHT
☐ Other: Edgewood Arsenal Industrial Area (HA-2069)

6. Classification

Category	Ownership	Current Function	Resource Count	
<input type="checkbox"/> district	<input checked="" type="checkbox"/> public	<input type="checkbox"/> agriculture	Contributing	Noncontributing
<input checked="" type="checkbox"/> building(s)	<input type="checkbox"/> private	<input type="checkbox"/> commerce/trade	<u>1</u>	<input type="checkbox"/> buildings
<input type="checkbox"/> structure	<input type="checkbox"/> both	<input checked="" type="checkbox"/> defense	<input type="checkbox"/>	<input type="checkbox"/> sites
<input type="checkbox"/> site		<input type="checkbox"/> domestic	<input type="checkbox"/>	<input type="checkbox"/> structures
<input type="checkbox"/> object		<input type="checkbox"/> education	<input type="checkbox"/>	<input type="checkbox"/> objects
		<input type="checkbox"/> funerary	<u>1</u>	<input type="checkbox"/> Total
		<input type="checkbox"/> government		
		<input type="checkbox"/> health care		
		<input type="checkbox"/> industry		
		<input type="checkbox"/> landscape		
		<input type="checkbox"/> recreation/culture		
		<input type="checkbox"/> religion		
		<input type="checkbox"/> social		
		<input type="checkbox"/> transportation		
		<input type="checkbox"/> work in progress		
		<input type="checkbox"/> unknown		
		<input type="checkbox"/> vacant/not in use		
		<input type="checkbox"/> other:		
			Number of Contributing Resources previously listed in the Inventory	
			<u>0</u>	

7. Description

Inventory No. HA-2096

Condition

<input type="checkbox"/> excellent	<input checked="" type="checkbox"/> deteriorated
<input type="checkbox"/> good	<input type="checkbox"/> ruins
<input type="checkbox"/> fair	<input type="checkbox"/> altered

Prepare both a one paragraph summary and a comprehensive description of the resource and its various elements as it exists today.

RESOURCES COUNT = 1

Summary

Building E5452 (Old Building # 601) was constructed as part of the multi-building mustard gas production plant during World War I in the chemical production area of Edgewood Arsenal. Edgewood Arsenal Industrial Area (HA-2069) historically was designed as a shell filling and chemical production plant during World War I.

Building E5452 is a two-story building that measures approximately 100 (7 bays) x 60 (3 bays) feet. The building has a steel frame infilled with structural clay tile. The exterior walls are stuccoed and painted. The building has a monitor roof with a continuous band of steel-frame industrial sash windows. The roof is sheathed with asphalt shingles. A continuous band of steel-frame industrial sash windows is located under the eave line in each long elevation. Single and multiple industrial sash windows also are located in the lower sections of the walls. Multiple doorways contain single and paired metal doors with lights.

The mustard gas production complex originally had four identical wings, of which Buildings E5440 and E5452 remain. Building E5452 was the first wing of the mustard gas plant to be completed; it was constructed between 14 May and 25 July 1918. As originally constructed, Building E5452 had a steel frame clad with corrugated iron siding. The upper portion of the building was installed by the Lackawanna Bridge Company. The original openings were ten sliding wood doors and four passage doors. The original windows were wood-frame units. The original equipment in the building was one eight-ton Levinstein reactor, three settling tanks, one safety tank, one brine reservoir, two surge pumps, and one safety pressure regulating device consisting of two metal barrels with piping. The installation of the Levinstein reactor represented a major change in the production of mustard gas. The Levinstein reactor was capable of producing 16 tons of high-quality mustard gas per day. Because of the change in technology, mustard gas production did not begin in Building E5452 until 1 October 1918 (Marshall and Ellicott 1919c:69-70, 70-72). All production ceased by 11 November 1918.

Changes to Building E5452 have been numerous since its construction. By July 1921, the exterior walls of the building had been rebuilt. The corrugated iron siding was replaced with structural clay tile walls. The building still retained wood-frame windows and wood doors (Laird and Scott 1921). In 1928, the tarpaper roof on the building was replaced with Flexstone roofing and the windows in the monitor roof were replaced.

After the end of World War I, the production of mustard gas was consolidated into the south wing of the original plant (demolished) and the Buildings E5452 and E5440 were adapted to other uses. Building E5452 was adapted to the production of brombenzyl cyanide (Laird and Scott 1921). In 1941, the building was readied for wartime production. During World War II, Buildings E5452 and E5440 operated as filling plants producing tear pots and M7 grenades with chemicals HC and CN. Operations that occurred in Building E5452 included filling land mines with simulated mustard (January-June 1941), filling 75mm shell with CNS and CNB (starting July 1941), and production of match heads and starter mix for tear pots (October 1943). The World War II production statistics for these two buildings were combined. The production capacity in these buildings was 3,600 tear pots and 3,600 grenades per 24-hour period. In all, World War II production in these buildings comprised 785,967 tear pots; 505,618 M7 grenades; 18,840 M25 grenades; 330,016 M6 CN-DM grenades; 45,971 miniature candles filled with HC; and, 307,002 76mm shells filled with HC (Edgewood Arsenal Plant Status 1946).

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In 1958, new steel sash windows and doors were installed throughout the building (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). No equipment was documented in 1997, and the building was vacant when inspected in November 2004 (Grandine and Armstrong 1997).

8. Significance

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Period	Areas of Significance	Check and justify below			
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> health/medicine	<input type="checkbox"/> performing arts	
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> archeology	<input type="checkbox"/> education	<input type="checkbox"/> industry	<input type="checkbox"/> philosophy	
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> architecture	<input type="checkbox"/> engineering	<input type="checkbox"/> invention	<input type="checkbox"/> politics/government	
<input checked="" type="checkbox"/> 1900-1999	<input type="checkbox"/> art	<input type="checkbox"/> entertainment/ recreation	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion	
<input type="checkbox"/> 2000-	<input type="checkbox"/> commerce	<input type="checkbox"/> ethnic heritage	<input type="checkbox"/> law	<input type="checkbox"/> science	
	<input type="checkbox"/> communications	<input type="checkbox"/> exploration/ settlement	<input type="checkbox"/> literature	<input type="checkbox"/> social history	
	<input type="checkbox"/> community planning		<input type="checkbox"/> maritime history	<input type="checkbox"/> transportation	
	<input type="checkbox"/> conservation		<input checked="" type="checkbox"/> military	<input type="checkbox"/> other: _____	

Specific dates 1918

Architect/Builder

Construction dates

Evaluation for:

☒ National Register

☒ Maryland Register

☐ not evaluated

Prepare a one-paragraph summary statement of significance addressing applicable criteria, followed by a narrative discussion of the history of the resource and its context. (For compliance projects, complete evaluation on a DOE Form – see manual.)

SUMMARY

Building E5452 was constructed as part of a multi-building mustard gas production plant at Edgewood Arsenal. Located on Gunpowder Neck in Harford County, Maryland, Edgewood Arsenal was founded by the U.S. Army in 1917 as the first chemical warfare production facility in the United States. The arsenal was established in response to the appearance of toxic gas weapons on the European battlefields. Because commercial chemical companies were reluctant to invest in such weapons, the U.S. government decided to build its own industrial production plant. Edgewood Arsenal remained the only government-owned and operated chemical warfare installation in the U.S. until World War II, when three other government-owned chemical warfare production arsenals were established. Edgewood Arsenal continued as the headquarters of the expanded chemical warfare program and the center for specialized and experimental tasks. Although established as a separate installation, Edgewood Arsenal currently is known as Edgewood Area of nearby Aberdeen Proving Ground. The two installations were joined administratively in 1971.

Because of its association with the World War I mustard gas plant established at Edgewood Arsenal, Building E5452 was identified as a historic building during a building survey conducted by the Historic American Buildings Survey in 1982 (Grandine and Henry 1982; HABS 1982). The building has been unused since the early 1980s and is extensively deteriorated.

Research to document Building E5452 was conducted at the Historical Office of the U.S. Army Soldier and Biological Chemical Command (Building E5027), at the Directorate of Installation Operations (DIO) at APG, and in the files and reports maintained by the APG Cultural Resources Manager (CRM). Research included examination of the individual building file, completion reports from World War I, documents from World War II, relevant CRM studies and reports, HABS documentation, and published secondary sources. In addition, real property records and selected drawings located at DIO were examined. All photography was completed by APG personnel.

RESOURCE HISTORY

Edgewood Arsenal was established as a new U.S. Army military installation in October 1917 in response to the introduction and use of toxic gas weapons on the battlefields in Europe during World War I. During the early years of the war, France, Britain, and Germany investigated the use of chemical agents for battlefield use. The German army first used chlorine gas successfully as a chemical weapon in April 1915 at Ypres. Chlorine gas was loaded into cylinders, which then were positioned to release a greenish-yellow gas cloud with a strong, suffocating odor that caused

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debilitating and lethal choking when it floated over enemy troops. The Allied troops responded to this technological innovation by developing protective devices, such as gas masks, and chemical weapons and delivery systems of their own. The introduction of other chemicals soon followed. The Germans began using phosgene, a lethal choking and blistering agent, and, in July 1917, introduced mustard gas, a lethal blistering agent that affected the eyes and lungs (Smart 1997; Crowell 1919:399).

When the United States entered World War I on the side of the Allies on 6 April 1917, the U.S. Army had very little experience with chemical weapons. The U.S. Army had begun to study the use of protective masks in fall 1915, but no work was conducted on gases. On 3 April 1917, the military established the Subcommittee on Toxic Gases to investigate the use and production of toxic gases and their antidotes for combat purposes. The subcommittee began organizing research on chemical agents at universities and in industry. The subcommittee actively involved civilian chemists to meet the new challenge (Smart 1997). In addition, French and British Allies shared substantial information to the Trench Warfare Section of the U.S. Army Ordnance Department.

Initially, the U.S. War Department assigned responsibility for chemical defense to the Medical Department, while the Ordnance Department was responsible for chemical munitions. The Corps of Engineers was assigned the responsibility for deploying chemical weapons (Smart 1997). On 28 June 1918, the Chemical Warfare Service was established and assigned all oversight responsibilities for chemical gas production, chemical weapons, and protective devices (Smart 1997; Marshall and Ellicott 1919a:4-7).

No specific authorization for the establishment and construction of Edgewood Arsenal was located in the official records (Marshall and Ellicott 1919a:4). The arsenal grew from a proposal in June 1917 to construct an experimental filling plant. In August 1917, Lt. Colonel Edwin M. Chance of the Trench Warfare Section was assigned the task of preparing plans for a toxic gas filling plant. After studying the plans of filling plants in France and England, Chance studied American commercial bottling plants. He found that the task for filling milk bottles and carbonated beverage bottles was most relevant to filling projectiles with toxic gases (Smart 1995:21).

Gunpowder Neck was selected as the site for the new filling plant after Gunpowder and Bush Necks were acquired by presidential proclamation on 16 October 1917 and assigned to the Ordnance Department (Marshall and Ellicott 1919a:4). Bush Neck became a new ordnance proving ground named Aberdeen Proving Ground, while Gunpowder Neck became known as the U.S. Filling Plant, Gunpowder Reservation. In April 1918, the name of the reservation was changed to Edgewood Arsenal (Marshall and Ellicott 1919a:13-14).

Edgewood Arsenal was an experimental installation and was assigned new missions over the 18 months it was under construction. Initial War Department plans for the new installation comprised a small filling plant. Construction contracts were signed with the Central Construction Corporation in October 1917 (Marshall and Ellicott 1919a:43). Actual work on shell filling plant # 1 began on 15 November 1917 (*Journal of Industrial and Engineering Chemistry* 1919:6-7; Marshall and Ellicott 1919b). Construction of shell filling plant # 1 was begun before the final designs were completed. The overall size of the filling plant was expanded to include two additional filling plants, so that many changes to the overall building designs and overall installation layout occurred during the construction process (Marshall and Ellicott 1919a:43-44).

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The War Department initially planned to purchase toxic gases from private industry to supply the shell filling plants at Edgewood Arsenal. The four primary chemical agents in World War I were chlorine, phosgene, chlorpicrin, and mustard gas. However, phosgene, chlorpicrin, and mustard gas had no commercial value; only chlorine and a small amount of phosgene were produced commercially in the U.S. prior to World War I. Commercial chemical companies were reluctant to develop industrial production facilities with no post-war use. The dangerous nature of the agents used in chemical weapons also deterred commercial manufacturers. In addition, railroad operators placed restrictions on transporting chemical gases. Consequently, the War Department revised plans for Edgewood Arsenal to include chemical production plants. Designs for the new chemical production plants were readied during December 1917 (*Journal of Industrial and Engineering Chemistry* 1919:7; Crowell 1921:396). The chemical production plant area was sited west of the shell filling plants and present-day Hoadley Road. The first chemical production plants were designed to manufacture phosgene and chlorpicrin (Marshall and Ellicott 1919c:2).

By 1918, plans were initiated to add a mustard gas plant to the chemical production area. The production of mustard gas was a relatively new technology to U.S. chemists since the gas was first introduced on the battlefield in 1917. Prior to April 1918, not more than 100 pounds of mustard gas had been made in the U.S. Although called a gas, mustard gas was more of a liquid since it froze at 57 degrees Fahrenheit. The chief properties of mustard gas were its burning effects when it came in contact with flesh and the fact that the victim was unaware of contact until after contact had occurred. Mustard gas was made from combining ethylene and sulphur chloride. Initially, the U.S. adapted the French process for making the gas in 330-pound French reactors. This process eventually proved ineffective and was replaced by Levinstein reactors (Marshall and Ellicott 1919c:69).

Mustard gas production began at Edgewood Arsenal in early 1918 when reactors were installed temporarily in an outdoor location while the plant was under construction (Smart personal communication 2005). The mustard gas production plant constructed at Edgewood Arsenal comprised 58 buildings and structures, including four mustard gas mixing buildings, a compressor house, a dryer building, a pump house, an oil heater building with a brick stack, a still house, a sulphur chloride building, a drum filling building, a car filling building, a shower bath and toilet building, and a laundry, locker, and washroom building for workers. The complex also had a number of gasholders, storage tanks, scrubbing towers, and fan houses. Four buildings remain from this complex: two mustard gas mixing buildings (Buildings E5440 and E5452), one car filling building (Building E5427), and the shower bath and toilet building (Building E5441).

The first mustard gas plant finished for operation was Building E5440. Construction began on 19 May and was completed 2 August 1918 by Levering and Garrigues Company. Gas production in this building commenced 3 August 1918 using 34 small type G, lead-lined French reactors and three settling tanks. About three weeks after Building E5440 entered operation, the method of mustard gas production was altered to use sulphur monochloride in Levinstein reactors. Mustard gas production in Building E5440 was halted on 21 August 1918 (Marshall and Ellicott 1919c:70-79; Smart 1995:28). The second mustard gas plant, Building E5452, entered operation on 1 October 1918. This building was adapted for the new process of mustard gas production and was equipped with an 8-ton Levinstein reactor and settling tanks (Marshall and Ellicott 1919c:70-79).

Building E5450 (no longer extant), the third mustard gas plant, also was equipped with a Levinstein reactor. The building was constructed between 19 May and 3 August 1918, and entered operation on 1 November 1918. The fourth plant was constructed between 19 May 1918 and 29 August 1918, but never was placed into production; it became a

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storehouse (Crowell 1919:403-407; Marshall and Ellicott 1919c:69-135). By 11 November 1918, the amount of mustard gas produced at Edgewood Arsenal was 711 tons (Crowell 1919:403).

By Armistice Day on 11 November 1918, Edgewood Arsenal functioned as an integrated production line to accommodate the multi-step process of chemical weapons manufacturing, even though it was built in various stages over 18 months. The installation included an area to assemble and produce raw materials, the chemical manufacturing plants, the shell filling plants, a finishing area where shells were tested for leakage and painted for labeling, and above-ground magazines to store chemical munitions prior to shipment. The installation contained 360 permanent buildings, 274 temporary buildings, and 31 miscellaneous structures, such as gasholders, tanks, scrubbing towers, stacks, and silos (Marshall and Ellicott 1919a:16, 53). When the Armistice was signed, all production at the arsenal ceased. Although most buildings in the complex were operational, full production capacity was not anticipated until December 1918.

The Chemical Plant area contained approximately 150 buildings and structures (Marshall and Ellicott 1919a:16-26). As designed, the chemical plants at Edgewood Arsenal had a 24-hour daily production capacity of 40 tons of phosgene gas, 25 tons of chlorpicrin gas, 30 tons of mustard gas, and 50 tons of chlorine gas (Marshall and Ellicott 1919a:47). Crowell (1919:401, 402, 403) reported that actual chemical production at Edgewood Arsenal comprised 2,320,000 pounds of chlorpicrin, 935 tons of phosgene, and 711 tons of mustard gas. Marshall and Ellicott (1919a:45) opined: "It is to be regretted that this magnificent plant did not come into full production as planned."

After World War I, Edgewood Arsenal remained a permanent installation, but at a much reduced level of activity. The National Defense Act of 1920 established the Chemical Warfare Service (CWS) as a permanent branch of the Regular Army separate and distinct from the Ordnance Department. The mission of the new service comprised development, procurement, and supply of all offensive and defensive chemical warfare materiel and smoke and incendiary weapons. In addition, the CWS was responsible for general training of Army personnel in chemical warfare, as well as organizing, equipping, and training specialists in chemical warfare (Smart 1997). With the exception of headquarters located in Washington, D.C., all activities of the CWS were concentrated at Edgewood Arsenal.

However, a general abhorrence for chemical warfare as practiced during World War I limited the role of this new service. In 1924, the Chemical Warfare Service was confined to studying defensive measures and equipment and to preparing a modest deterrent or retaliatory capability; the United States would not develop chemicals as an offensive measure (Brophy and Fisher 1959:21-23). Within this framework, Edgewood Arsenal served as the primary CWS installation and became the center of training, stockpiling, and research and development for chemical warfare materiel. The major chemical industrial plants and filling plants were placed on standby status.

In 1928, the CWS selected seven agents and smokes as the most important chemical agents in the military arsenal. The seven agents were mustard agent (HS), methyldiflourarsine (MD), diphenylaminechlorarsine (DM), chloroacetophenone (CN), titanium tetrachloride (FM), white phosphorus (WP), and hexachlorethane (HC). Phosgene (CG) and Lewisite (L) were considered of lesser importance, and chlorpicrin (PS) and chlorine (Cl) were rated least important (Smart 1997). Throughout this time, military planners hypothesized that the chemical agents likely to be used in any future war would be the same ones used in World War I. Mustard agent was considered to be the principal agent for combat use. Stockpiles of chemical agents that remained from World War I were stored at Edgewood Arsenal. In 1937, the mustard gas production plant (Building E5450 demolished) was rehabilitated and produced 154 tons to increase that stockpile. That same year, the phosgene production plant was renovated for production (Smart 1997).

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During World War II, President Roosevelt declared that the United States would not use chemical weapons offensively, but would retaliate with chemical weapons defensively. The warning read: "Any use of gas by any axis power, therefore, will immediately be followed by the fullest possible retaliation upon munition centers, seaports, and other military objectives throughout the whole extent of the territory of such axis country" (Smart 1997). This warning had its desired effect. The Axis powers never resorted to the use of toxic gases, although the U.S. knew that both Germany and Japan had chemical agent capabilities. The full extent of those capabilities was only known after the end of the war. Germany had approximately 78,000 tons of chemical warfare agents, while Japan had about 8,000 tons. In contrast, the U.S. produced approximately 146,000 tons of chemical agents between 1940 and 1945 (Smart 1997).

The CWS headquartered at Edgewood Arsenal was in charge of preparations to protect troops against the use of chemical weapons and to activate chemical warfare if instigated by the enemy. During the protective mobilization phase leading up to the formal declaration of World War II following the bombing of Pearl Harbor on 7 December 1941, the CWS underwent a major expansion in personnel and activity. Beginning in 1939, educational orders were placed with private industry for the production of gas masks. Approximately 80,000 gas masks were procured under this program, and additional storage for CWS supplies was needed. In June 1940, President Roosevelt signed the Military Appropriations Act of 1941 that authorized major increases in military spending. Preparations for possible war continued to escalate following the passage of the Lend-Lease Act in March 1941. The overall personnel strength of the CWS increased to 800 officers and 5,000 enlisted men. CWS appropriations increased to over \$60 million during fiscal year 1941 as a result of successive military supplemental appropriations (Smart 1997).

CWS prepared for the contingency that chemical weapons might be deployed on the battlefield. Initially, CWS efforts were focused on construction and renovation projects at Edgewood Arsenal, the service's only chemical warfare installation. Between 1 September 1939 and 7 December 1941, \$27 million dollars of the total CWS budget of over \$64 million were directed towards new construction and repair projects at Edgewood Arsenal (Brophy et al. 1959). Each division within the Edgewood Arsenal administrative structure required additional facilities in order to perform wartime functions. The expansion at the arsenal is described by the following statistic. In June 1940, the number of buildings at Edgewood Arsenal numbered 498. In June 1945, the total number of buildings on the installation was 1,269 comprising 669 permanent buildings, 259 temporary cantonment buildings, and 342 buildings described as "miscellaneous temporary types" ("History of Edgewood Arsenal" ca. 1945:606).

The Production Division oversaw upgrades to and new construction of the industrial plants, including chemical production facilities and shell-filling facilities. Early projects included renovating and upgrading the mustard gas plant (no longer extant) and the phosgene plant (no longer extant) and constructing new filling plants. New construction projects were the horse gas mask factory (no longer extant), collective protector and canister plant (Building E5685), the adamsite (DM) manufacturing plant (Buildings E5635-E5648), and the mustard filling plant (Building E5185) ("History of Edgewood Arsenal" ca. 1945).

Ten chemical manufacturing plants operated at Edgewood Arsenal during World War II. The ten plants were: CN manufacturing in Building E5380 (Plant 2), sulphur monochloride plant in Building E5370 (no longer extant), impregnating and decontaminating agents in Building E5625 block (no longer extant), phosgene in E5300 block (Plant 7) (no longer extant), chlorine (no longer extant), mustard in Building E5450 (Plant 6) (no longer extant), CC2 (Plant 8)

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(no longer extant), whetlerite in Building E5427, distilled mustard agent in Building E5476, and CN in Building E5440 (Plant 1) (Edgewood Arsenal Plant Status 1946; "History of Edgewood Arsenal" ca. 1945).

Between July 1940 and June 1942, the entire production load for CWS items was handled at Edgewood Arsenal, excepting items normally procured from private industry suppliers. However, early in the planning stages, it was realized that the industrial capabilities at Edgewood Arsenal were limited and additional production installations were needed to meet the potential demand for chemical weapons. Between 1941 and 1943, CWS established three new chemical production arsenals and associated ordnance assembly and storage facilities: Huntsville/Redstone Arsenal, Alabama (1941-1942); Pine Bluff Arsenal, Arkansas (1942); and, Rocky Mountain Arsenal, Colorado (1943) ("History of Edgewood Arsenal" ca. 1945). Edgewood Arsenal became the center for specialized and experimental tasks, such as the establishment of pilot plants to test new chemicals and new production processes. The experiments were completed on temporary production lines by experienced personnel and under the control of the Technical Division. In this way, the production could be standardized prior to the implementation of large-scale industrial production ("History of Edgewood Arsenal" ca. 1945:513).

After the end of World War II, the Chemical Warfare Service (CWS) was demobilized and the chemical manufacturing plants, including Buildings E5440 and E5452, were closed and placed on standby. Since gas was not used on the battlefields during World War II, some military strategists considered it an antiquated technology, particularly when contrasted with the atomic bomb. The CWS undertook a vigorous defense of its role in the peacetime army and argued in defense of chemical and biological preparedness. In 1946, the CWS was redesignated as the Chemical Corps, a permanent technical corps in the army structure. Edgewood Arsenal was renamed the Army Chemical Center. However, the role of chemical warfare remained a hotly debated topic immediately following World War II and throughout the Cold War era.

9. Major Bibliographical References

Inventory No. HA-2096

Aberdeen Proving Ground, Directorate of Installation Operations (DOI)
Real property records, drawings files.

Brophy, Leo P., and George J.B. Fisher

1959 *The Chemical Warfare Service: Organizing For War*. Office of the Chief of Military History, Department of the Army, Washington, D.C.

10. Geographical Data

Acreage of surveyed property under 1 acre

Acreage of historical setting under 1 acre

Quadrangle name Edgewood, MD

Quadrangle scale: 1:24,000

Verbal boundary description and justification

The boundary encompasses the footprint of the building.

11. Form Prepared by

name/title	Katherine Grandine, Senior Historian		
organization	R. Christopher Goodwin & Associates, Inc.	date	August 2006
street & number	241 E. Fourth Street, Suite 100	telephone	301-694-0428
city or town	Frederick	state	Maryland

The Maryland Inventory of Historic Properties was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

return to: Maryland Historical Trust
DHCD/DHCP
100 Community Place
Crownsville, MD 21032-2023
410-514-7600

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Brophy, Leo P., Wyndham D. Miles, and Rexmond C. Cochrane

1959 *The Chemical Warfare Service: From Laboratory to Field*. Office of the Chief of Military History, Department of the Army, Washington, D.C.

Crowell, Benedict

1919 *America's Munitions 1917-1918*. U.S. Government Printing Office, Washington, D.C.

1921 *The Armies of Industry*. Yale University Press, New Haven.

EAI Corporation

Var. Record Search and Assessment for Edgewood Area Buildings. Multi-year, multi-volume study. Prepared for U.S. Army Chemical Research, Development and Engineering Center, APG, by EAI Corporation, Abingdon, Maryland, under contract DAAA15-87-D-0021. On file at U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area.

Edgewood Arsenal Plant Status

1946 Report on file at U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area.

Goodwin, R. Christopher, and Associates, Inc.

2001 *Aberdeen Proving Ground Integrated Cultural Resources Management Plan*. Prepared by R. Christopher Goodwin & Associates, Inc., Frederick, Maryland, in conjunction with the U.S. Army Corps of Engineers, Baltimore District, Baltimore, Maryland.

Grandine, Katherine, and Jane Armstrong

1997 *Object Inventory, Edgewood Area, Aberdeen Proving Ground, Summary Report*. Prepared by R. Christopher Goodwin & Associates, Inc., Frederick, Maryland, on behalf of the U.S. Army Corps of Engineers, Baltimore District, Baltimore, Maryland.

Grandine, Katherine, Irene Jackson Henry, and William R. Henry, Jr.

1982 *DARCOM Historic Building Inventory: Aberdeen Proving Ground, Maryland*. Prepared by the Historic American Buildings Survey/Historic American Engineering Record, U.S. Department of the Interior.

Historic American Buildings Survey/Historic American Engineering Record

1982 HABS/HAER Inventory records on file at the APG Cultural Resources Management Office, Building 5650, DSHE, Aberdeen Area and at the HABS/HAER collections of the Library of Congress, Washington, D.C.

Historical Branch, OC CWS

1943 "Edgewood Arsenal in Chemical Warfare Production (July 1940-December 1943)." Typescript on file at U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area.

Maryland Historical Trust

Maryland Inventory of Historic Properties Form

Inventory No. HA-2096

Building E5452, Edgewood Area, Aberdeen Proving Ground
Harford County, Maryland

Continuation Sheet

Number 9 Page 2

"History of Edgewood Arsenal: 1939-1945"

1945ca.2 Vols. Typescript on file at U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area.

The Journal of Industrial and Engineering Chemistry

1919 "Gas Offense in the United States: A Record Achievement." Vol. II, No. I, January, pages 5-12.

Laird, A.W., and C.M. Scott

1921 Brombenzyl Cyanide Plant Report. 1 July. On file at U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area, APG.

Marshall, R.C., Jr., and Edward B. Ellicott

1919a *Introduction to Report on the Construction of the Edgewood Plant of the Edgewood Arsenal*. Available at NARA, Record Group 77, and U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area, APG.

1919b *Report on the Construction of the Filling Plants at Edgewood Plant of the Edgewood Arsenal*. Available at NARA, Record Group 77, and U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area, APG.

1919c *Report on the Construction of the Chemical, Mustard Gas and Refrigeration Plants at Edgewood Plant of the Edgewood Arsenal*. Available at NARA, Record Group 77, and U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area, APG.

National Archives and Records Administration (NARA)

n.d. Record Group 77, Entry 391, Boxes 93-96: Edgewood Arsenal. College Park, Maryland.

n.d. Record Group 77, Entry 393: Edgewood Arsenal. College Park, Maryland.

n.d. Record Group 92; Construction Division, Completion Reports, Edgewood Arsenal. College Park, Maryland.

Smart, Jeffrey K., Command Historian

1994 *U.S. Army Chemical and Biological Defense Command Historical Highlights*. U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building E5027, Edgewood Area.

1995 "From Plowshare to Sword: Historical Highlights of Gunpowder Neck and Edgewood Arsenal to the End of World War I." *Harford Historical Bulletin*. Number 63, Winter 1995, Harford County, Maryland.

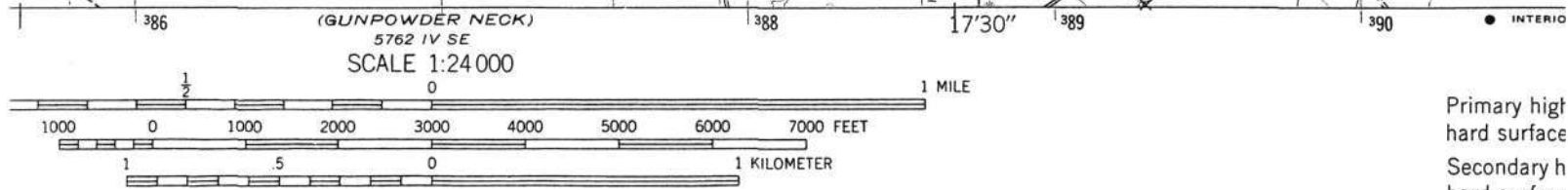
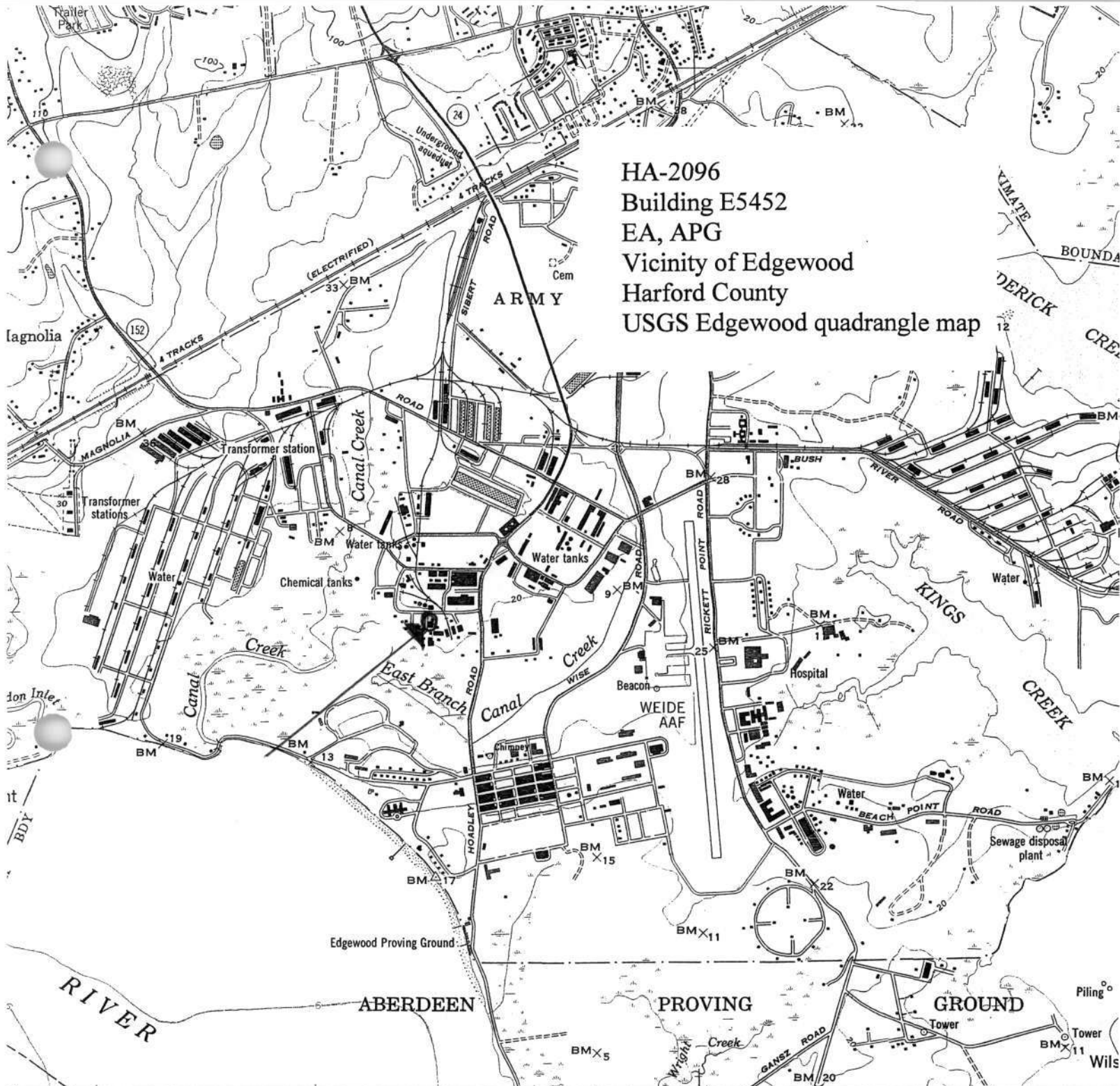
1997 "History of Chemical and Biological Warfare: An American Perspective." Published in *Medical Aspects of Chemical and Biological Warfare*. Available at http://www.cyber.acomp.usf.edu/sequence/feces/MedicalAspectsofNBC/chapters/chapter_2. Viewed 10/8/2004.

2005 Personal communication.

U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team

n.d. Building vertical files, historic photographs, historic maps. Located in Building E5027, Edgewood Area.

HA-2096
Building E5452
EA, APG
Vicinity of Edgewood
Harford County
USGS Edgewood quadrangle map



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES IN FEET DATUM IS MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 1.5 FEET

PRIMARY HIGH HARD SURFACE
SECONDARY HIGH HARD SURFACE
INTERIO

QUADRANGLE LOCATION

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225
OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



HA-2096

Building E5452

Harford Co. MD

Mark Gallihue, APG CRM

May 2005

APG CRM office, DSHE

view SE

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A black and white photograph of a long, two-story industrial building in a state of significant disrepair. The building's exterior is covered in peeling paint and patches of ivy. A sign on the right side of the building reads "CROC SMOKE DIV" and "ADV TEL H BR". The building features a series of large, multi-paned windows along its length. To the left, a paved road runs alongside the building, with utility poles and power lines visible. The foreground is filled with tall grass and weeds.

CROC
SMOKE DIV
ADV TEL H BR

HA-2096

Building E5452

Harford Co, MD

Bud Keese, Ruth Golding, APG DSHE

May 2006

APG CLM office, DSHE

View 5

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HA-2096

Building ES452

Harford Co. MD

Bud Keese, Ruth Golding, APG DSHE

May 2006

APG CRM office, DSHE

View W

3/4



HA-2096

Bldg E5452

Harford Co. MD

Bud Keese, Ruth Golding, APG DSHE

May 2006

APG CRM office, DSHE

View N

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